

## WHAT IS CLAIMED IS:

1. A method for controlling fluid flow to and from an eye during ophthalmic surgery, said method composing the steps  
5 of:

introducing irrigation fluid into an eye;  
determining initial irrigation fluid pressure;  
adjusting irrigation fluid flow based on the  
determined initial irrigation fluid pressure;  
10 continuously determining irrigation fluid pressure  
after the initial determination; and  
continuously adjusting irrigation fluid flow based  
on the continuous determination of irrigation fluid pressure.

15 2. A method for controlling fluid flow to and from an eye during ophthalmic surgery, said method composing the steps  
of:

introducing irrigation fluid into an eye;  
determining initial irrigation fluid pressure;  
20 adjusting aspiration fluid flow based on the  
determined initial irrigation fluid pressure;  
continuously determining irrigation fluid pressure  
after the initial determination; and  
continuously adjusting aspiration fluid flow based  
25 on the continuous determination of irrigation fluid pressure.

3. A method for controlling fluid flow to and from an eye during ophthalmic surgery, said method composing the steps  
of:

introducing irrigation fluid into an eye;  
determining initial irrigation fluid pressure;  
adjusting maximum vacuum setting based on the  
determined initial irrigation fluid pressure;  
5 continuously determining irrigation fluid pressure  
after the initial determination; and  
continuously adjusting maximum vacuum setting based  
on the continuous determination of irrigation fluid pressure.

10 4. The method according to claim 1 further comprising  
the step of using a positive displacement pump to introduce  
the irrigation fluid and the step of adjusting irrigation  
fluid flow includes adjusting pump speed.

15 5. The method according to any one of claims 1, 2 or 3  
where the step of initially determining irrigation fluid  
pressure and continuously measuring irrigation fluid pressure  
includes determining in-line irrigation pressure.

20 6. The method according to claim 2 wherein the step of  
adjusting aspiration fluid flow includes setting a maximum  
aspiration vacuum pressure as a function of determined  
irrigation fluid pressure.

25 7. The method according to claim 6 wherein the function  
is linear.

8. The method according to any one of claims 1, 2 or 3 further comprising the step of using a change in irrigation fluid pressure to provide an indication of wound leaking.

5 9. A method for controlling fluid flow to and from a phacoemulsification handpiece, the handpiece including an ultrasonically driven, hollow needle, said method comprising the steps of:

inserting the needle into an eye for  
10 phacoemulsification of eye tissue;

introducing irrigation fluid into the eye;

aspirating fluid from the eye through the hollow  
needle;

determining initial irrigation fluid pressure;

15 adjusting irrigation fluid flow and aspiration fluid  
flow based on the determined initial irrigation fluid  
pressure;

continuously determining irrigation fluid pressure  
after the initial determination; and

20 continuously adjusting irrigation fluid flow and  
aspiration fluid flow based on the continuous determination of  
irrigation fluid pressure in order to accommodate changes in  
needle incision size and wound stretching during eye surgery.

25 10. The method according to claim 9 further comprising  
the step of using a positive displacement pump to introduce  
the irrigation fluid and the step of adjusting irrigation  
fluid flow includes adjusting pump speed.

11. The method according to claim 10 wherein the steps of initially determining irrigation fluid pressure and continuously measuring irrigation fluid pressure including determining in-line irrigation pressure.

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12. The method according to claim 9 wherein the step of adjusting aspiration fluid flow includes setting a maximum aspiration vacuum pressure as a function of determined irrigation fluid pressure.

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13. The method according to claim 12 wherein the function is linear.

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14. The method according to claim 9 further comprising the step of using a change in irrigation fluid pressure to provide an indication of wound leaking.

15. Apparatus for controlling fluid flow to and from an eye, said apparatus comprising:

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a supply of irrigation fluid;

a positive displacement pump for introducing irrigation fluid from said supply of irrigation fluid into an eye;

a vacuum source for aspirating fluid from the eye through a hollow needle;

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a pressure sensor for determining pressure of irrigation fluid introduced into the eye; and

a control system for adjusting irrigation fluid and aspiration fluid flow rates in response to determined irrigation fluid pressure.

5        16. The apparatus according to claim 15 wherein said pressure sensor is disposed in a line interconnection, said positive displacement pump and the needle.

10        17. The apparatus according to claim 15 where said pressure sensor is disposed in the eye.

15        18. The apparatus according to claim 15 wherein said control system includes an indicator for enabling monitoring by a surgeon of wound constriction consistency based upon irrigation fluid pressure.

19. The method according to claim 12 wherein the function is linear.

20        20. The method according to claim 9 further comprising the step of using a change in irrigation fluid pressure to provide an indication of wound leaking.

25        21. Apparatus for controlling fluid flow to and from an eye, said apparatus comprising:

a supply of irrigation fluid;

a positive displacement pump for introducing irrigation fluid from said supply of irrigation fluid into an eye;

a vacuum source for aspirating fluid from the eye through a hollow needle;

a pressure sensor for determining pressure of irrigation fluid introduced into the eye; and

5 a control system for adjusting irrigation fluid and aspiration fluid flow rates in response to determined irrigation fluid pressure.

22. The apparatus according to claim 15 wherein said  
10 pressure sensor is disposed in a line interconnection, said positive displacement pump and the needle.